

The wet pack problem is an age old predicament that can occur in steam or ethylene oxide sterilization processing. There is no "magic recipe" to prevent wet packs beyond the obvious: well designed items, properly prepared and presented to a properly functioning sterilizer that is supplied with good quality and efficiently delivered steam.

Unfortunately, there are times when there are no simple answers, no one common denominator that when addressed, necessarily solves the problem. Wet packs have been known to disappear just as curiously as they appeared. Several factors require investigation when troubleshooting wet packs. Investigators can be at a loss to explain why the problem occurred and when or if to expect it again. In fact, there are some geographical areas where wet packs seem to be historically seasonal, and the reason not easy to identify.

WET PACKS — The Problem, the Players and Improving Central Service Techniques represents "food for thought" and a "place to begin" when troubleshooting wet packs.

First — THE PROBLEM:

What constitutes a wet pack?

Simply put, it is the presence of moisture **on** or **within** a pack of instruments, utensils or linen after a completed sterilization cycle. This moisture can be detected in the form of slight dampness to visible droplets.

Why is a wet pack unacceptable?

A wet pack, particularly a wet wrapper, could permit surface microorganisms to migrate, penetrate the pack, and render its contents contaminated. It is therefore not uncommon, nor incorrect, for Central Service and/or Operating Room personnel to reject a pack that has a dry wrapper but moisture within.

Isn't that internal moisture sterile?

That's not altogether unlikely; however, for the patients' safety we must consider two possibilities:

1. There may have been an externally wet wrapper. That wetness (along with surface microorganisms) could penetrate the pack and, subsequently, dry from the outside to the inside.
2. Excessive internal moisture could be absorbed by wrapping materials and migrate to the outer surface of the pack (permitting surface microorganisms to enter). The pack could subsequently dry from the outside to the inside.

WET PACKS

The Problem - The Players & Improving Central Service Techniques

In either case, the pack is potentially contaminated. Why take a chance?

An unrecognized wet pack is probably more critical than one easily identified because it may be inadvertently used.

Why am I having a wet pack problem? I never noticed one before.

Perhaps you did have a problem but it went unrecognized for one reason or another. More often than not, wet pack problems surface or are recognized:

- Upon moving into a new department, particularly with new sterilizers or when a new sterilizer (an unfamiliar brand or model) is installed next to a supposed long time friendly sterilizer.
- Along with boiler and/or plumbing changes.
- Upon seasonal changes when steam and/or air conditioning requirements change.
- When personnel and/or management changes in Central Service or the Operating Room.
- When new medical devices are being introduced to sterilization.
- When new wrap materials or rigid containers are being introduced.
- When a consultant arrives to survey sterilization practices.

Let's consider each of these factors and identify its significance in the wet pack problem:

New department and/or new sterilizers

- Has the hospital provided for equipment installation according to manufacturer specifications?
- Are personnel satisfied with the choice of sterilizing equipment; are they looking for flaws? Are they checking the end product more closely than ever before? Are they certain the problem does not exist with products processed in the older sterilizer as well? This is a particularly important question if product preparation and loading technique problems have been identified.
- Is the sterilizer being operated according to manufacturer recommendations?

Boiler/plumbing changes

- Is there good quality steam that is properly trapped and delivered to the sterilizer per recommendations of the sterilizer manufacturer?

Seasonal changes

- Is adequate steam pressure being maintained during the various seasons to provide for sterilizer requirements?
- Do water conditions and boiler treatments vary according to season even though steam requirements for the sterilizer remain the same? Are they compatible?
- Do ambient air temperature and relative humidity controls vary depending on seasonal changes even though requirements for the sterile processing and storage areas remain the same — temperature 18-22°C or 64-72°F and relative humidity 35-70 percent?
- Are processed items subjected to extremely chilled air conditioning once they are removed from the sterilizer?
- Is chilled air being drawn into the sterilizer during the drying phase of the cycle.

New personnel and/or management

- May identify poor and/or compromising techniques based on previous training and/or experience, and, in that, reveal a wet pack problem.
- May cause a problem due to lack of experience; may not understand the need for adherence to specific principles and practices; may misinterpret instructions provided by peers.
- May fall victim to poor orientation and follow up, poor supervision, inconsistent policies, procedures, and inservice training.

New medical devices

- Inservice education may have been misunderstood or lacked complete instructions and/or essential highlights regarding proper cleaning and preparation of the item for the process of sterilization, e.g. special time/temperature requirements.
- Devices may have particular idiosyncrasies to consider; e.g., excess weight and mass that require unusual heat up/cool down times or areas that may trap steam, that will later condense and result in a wet pack.

New wrap/rigid container implementation

- Key factors related to correct use may be improperly applied, or overlooked as a result of an incomplete or misunderstood inservice demonstration; therefore wet packs may occur.
- Some containers can be stacked during sterilization, but stacking techniques may differ; others cannot be stacked.
- Sterilization exposure and drying times may differ from those generally prescribed by sterilizer manufacturers — they may be longer.

The consultant

- Arrives to assist with sterilization principles and practices and perhaps the implementation of a new department and new equipment. Suspect practices that usually result in wet packs are observed, investigated, and a problem never noticed before is found.

These insights may not be new to you but they reinforce the fact that a wet pack problem can be complex.

On to — THE PLAYERS:

It is amazing how the occurrence of wet packs can send otherwise easy-going people into a frenzy . . . and . . . the worlds of so many upside-down. Even more dramatic are the defensive tactics that take place among the players.

This is, in part, the result of fear. Fear that, as a result of wet pack contamination, patients can be harmed by nosocomial (hospital acquired) infections. Fear that the patients' length of stay will increase and a monetary penance will be paid. Fear that someone, the hospital, and/or a physician, as well as a manufacturer may be found negligent and be held legally responsible.

Besides those very valid fears, a wet pack problem can be extremely time consuming, expensive and frustrating. It poses a great inconvenience for all concerned.

Knowing all that, I suggest that less energy be spent on the defense and more on offense. Let's act on preventing wet pack problems as a team. Each of the players must closely evaluate the principles of sterilization that are relevant to his or her scope and/or involvement in the process.

Who are the players, you ask? The **immediate** players are the sterilizer manufacturers, their service representatives, the hospital engineers and the hospital personnel involved in preparation of items for sterile processing. Equally significant players include the manufacturers of sterilization wrappers and rigid containers, surgical instruments, medical devices and utensils.

In brief:

- The **sterilizer manufacturers** are charged with the responsibility of designing equipment that will efficiently and

effectively sterilize items that have been properly prepared for that process. They are also expected to provide appropriate instructions for proper installation as well as safe use, operation and maintenance.

Preinstallation instructions from the sterilizer manufacturer generally address data and specifications regarding the necessary hospital supplied utilities.

For instance: required dynamic steam and water pressures, water temperature; properly delivered, piped and trapped steam and/or ethylene oxide; the need for condensate free (97-100%) steam [no more than approximately 3% of the steam/condensate mixture supplied to the sterilizer should be condensate (water)].

- The sterilizer manufacturer's **service representative** is expected to efficiently and effectively fulfill the contract requirements of the service agreement with the hospital. That should include an on-going preventative maintenance contract to routinely examine the sterilizer to verify that it is operating to the manufacturer's specifications. That service will, hopefully, head off failures before they occur . . . something like changing the oil and rotating the tires of your car.
- The **hospital engineers** are generally required to at least maintain consistently appropriate services and utilities to the sterilizer per the manufacturer's data and specifications. In some hospitals, they are responsible for full or partial maintenance of the sterilizer; in others, to be certain that proper service is being provided by qualified technicians. It is important to note that the most up-to-date and proficient technicians are generally available through, or are trained by, the sterilizer manufacturer.
- The **hospital personnel** involved in the preparation of items for sterile processing often include more than those people working in the Central Service Department. Those other people represent the operating room, radiology, cardiac catheterization, pulmonary function and clinical labs, outpatient surgery and clinics, scientific research laboratories, physicians offices, other hospitals, affiliated dental schools, obstetrics, the nursery, the emergency room and ambulatory surgery centers . . . just to name a few.

The responsibility of the **Central Service** manager is to establish and enforce technically correct sterilization processing policies and procedures. This includes requirements for proper cleaning, inspection, assembly/disassembly, wrapping, loading, sterilization cycles, documentation, unloading, handling, storage and distribution of all items to be processed.

All departments requiring sterilization services must be expected to adhere to those policies and procedures that pertain to their role in sterilization processing, **without exception**. There are certain essential principles of sterilization that cannot be taken for granted. The right hand must know what the left hand is doing. If a department refuses to comply with Central Service requirements, sterilization services must be denied — for the patients' sake!

We're all potential patients. We all expect that quality assurance measures are inherently employed in the preparation of items to be used in patient care. And why shouldn't we?

Two additional factors must be considered:

1. The product evaluation and selection process should include the Central Service manager when sterilizable products are being considered for purchase by any department.
2. **Centralized** sterilization processing departments generally have fewer wet pack problems because all elements of preparation can be more easily governed and audited.

The bottom line is that breakdowns in processing techniques can prohibit sterilization or the maintenance of that state once it has been achieved, particularly if wet packs occur.

Wrap and rigid container manufacturers are expected to have verified the performance compatibility of their products with the process of steam and ethylene oxide sterilization cycles. The products must permit proper air removal, sterilant penetration/evacuation and drying (as well as effective aeration of items sterilized by ethylene oxide).

During product evaluation, the hospital should verify the manufacturers' sterilization and drying performance claims by conducting equivalency testing in their processing environment and each individual sterilizer. It is important to note before purchase that the hospital can duplicate results.

Complete inservice education regarding the proper use of those containment products is essential and is the responsibility of the manufacturer. Special details regarding proper use of the product must be clearly explained to the user. For instance:

- Some rigid containers may require extended sterilization exposure and drying times and that information should be provided by the **manufacturer of the container** not the sterilizer manufacturer.
- Some rigid containers perform better during "drying" when absorbent surgical towels are included within the instrument sets.
- Can the container be stacked during sterilization? How?
- Is the containment method suitable for ethylene oxide sterilization and aeration?
- Is the containment method suitable for general purpose gravity and/or FLASH sterilization?
- Are dedicated loads necessary when sterilizing rigid containers of instruments?
- Is there a maximum number of rigid containers per load?
- Is there a maximum weight per rigid container?
- Some disposable non-woven wraps perform better during "drying" when absorbent materials such as surgical towels are included in the wrapped instrument and basin set assemblies.
- The incidences, reasons for, and consequences of wet packs related to their product.

Surgical instrument and medical device manufacturers are expected to pay close attention to the principles and dynamics of sterilization when designing items requiring that process-

ing. However, certain necessary design factors that directly relate to the proper handling and use of a surgical instrument/device can pose difficulties that contribute to the occurrence of some wet packs.

For instance:

- Some items cannot be adequately disassembled. They trap steam vapor that cannot escape, will condense, and can produce a wet pack.
- "When it rains, it pours" — consider the heavy and/or dense mass of metal that some surgical instruments/devices are made of (e.g. a "bone mill set," a weighted speculum, hip replacement instrumentation, and a particularly heavy device used to prepare a split thickness skin graft for transplantation). The fact is that metal mass acts as a heat sink. As it absorbs heat from the steam, the vapor actually collapses or condenses and becomes water. When a particularly heavy metal surgical instrument is sterilized, that condensation can be in excess and very difficult, if not impossible, to revaporize and dry.
- Some metal boxes designed to contain various orthopedic surgery devices and instruments may inhibit sterilant evacuation and drying.

Utensil Manufacturers would significantly contribute to the production of dry packs if they would address a few recognized problems:

- The curled and/or turned rims of some stainless steel utensils (emesis basins, solution bowls, large basins, flat instrument trays and deep rectangular instrument trays) can actually be a significant factor in a pack that is found to be wet. That rim can and often does pool condensate causing a wet pack. Crimping that rim and/or not curling it to create a channel would be helpful.
- Not all stainless steelware, although called "instrument trays or perforated trays" is suitable for, or designed with, the containment of heavy surgical instrument sets in mind. However, 16 pounds of instruments and more are being sterilized on these trays or pans — some with perforations, some without, and all of them generally presented tilted on edge to the sterilizer. A wet pack is imminent.
- The manufacturers' clarification of the intended and proper use of these trays would be helpful.

The PLAYERS all represent a broad source of experience and technology. It is appropriate for all containment manufacturers, utensil, surgical instrument and device manufacturers to consult with sterilization technology services during the design/development phase of the product research. Central Service, operating room managers and sterilizer manufacturers, in particular, would all welcome the collaborative research. At least certain potential wet pack incidents might be avoided.

IMPROVING CENTRAL SERVICE TECHNIQUE

So far, we've taken a broad look at a number of factors that contribute to wet pack problems. A certain amount of repeti-

tion has been apparent but necessary for emphasis of important points.

Now it's time to concentrate on improving the Central Service techniques used in preparation of items to be sterilized. Realize that items improperly prepared and presented to the sterilization process are recognized as a common contributing factor in the occurrence of wet packs. However, as previously discussed, they are by no means the only probable cause.

Let's review the basic techniques of preparation of items to be sterilized. Some might argue that these practices are obsolete since modern sterilization cycles employ sophisticated air removal systems. However, wet packs have been seen to occur in very likely places when proper techniques have been ignored, but not when corrected. Furthermore, gravity displacement sterilizers, for which these practices were first recommended are still in use in a number of hospitals.

Probably the best argument for requiring adherence to those basic techniques is that:

- The **probability of sterilization is enhanced** when a properly prepared item is properly presented to the sterilization process.
- **QUALITY ASSURANCE** demands consistency and no deviation in product preparation from one person to the next.
- The occurrence of wet packs due to preparation infractions would be less likely.

REVIEW BASIC TECHNIQUES of preparation in your department to see if improvements are needed.

- Do you have a specific protocol for the preparation of items to be sterilized? Are policies and procedures clearly documented so they are easy to understand and follow?
- Are personnel properly oriented to the process? Be certain employees know what you expect of them. Does that orientation clearly demonstrate the need for accuracy and attention to detail? Do the employees understand the consequences of not performing these tasks properly? For instance, items may not be properly sterilized and/or wet packs may occur.
- Do you audit the preparation and sterilization process to assure that the prescribed protocol is being followed and applied effectively?
- Stress **TEAMWORK** - The **RIGHT** hand must know what the **LEFT** hand is doing for a successful outcome.

INSTRUMENT PREPARATION

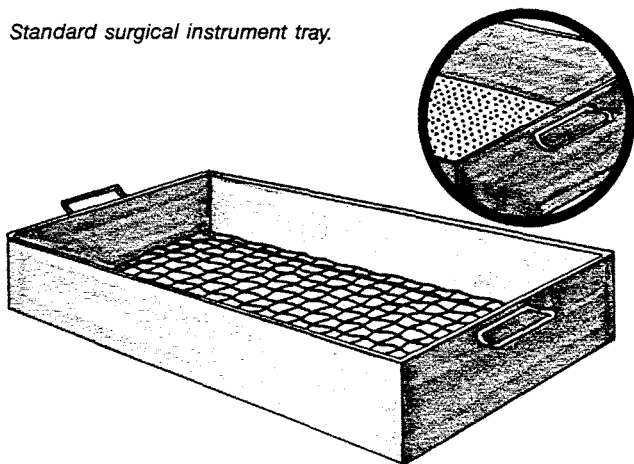
Instrument set descriptions should go beyond the routine "Kardex" listing and include the proper type and size of instrument tray, rigid sterilization container or wrap material; wrapping method; type of chemical indicator, etc. Photo-

graphs and/or diagrams are helpful to display instruments as they are expected to be assembled or disassembled and arranged in the tray for sterilization.

Things to remember:

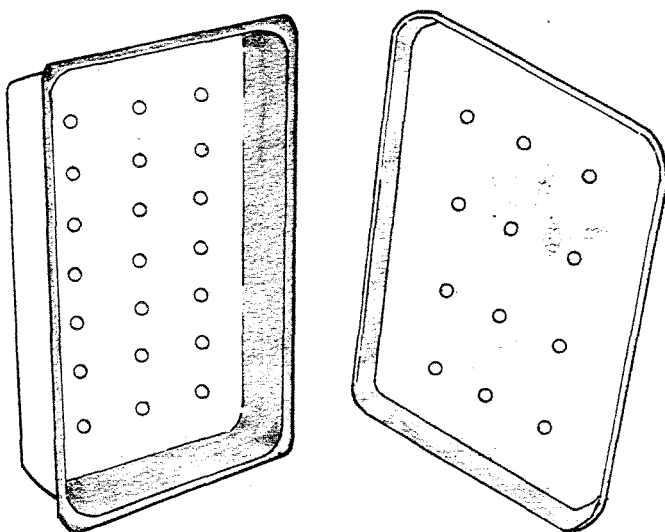
- The “**standard**” **surgical instrument tray** has multiple perforations on the bottom of the tray and has 2-1/2” to 4” solid metal sides. The trays come in various sizes, and are designed so that surgical instruments can be arranged well within the pan to protect them and provide for proper air

Standard surgical instrument tray.



removal, steam penetration and more efficient drying. This instrument tray is designed to sit flat on the sterilizer cart or shelf.

- Some rigid sterilization containers can be stacked in sterilization and others can not; check with manufacturers for specifics. Challenge stacking in sterilization with biologic testing.



Cake pan tray and flat tray, both with holes.

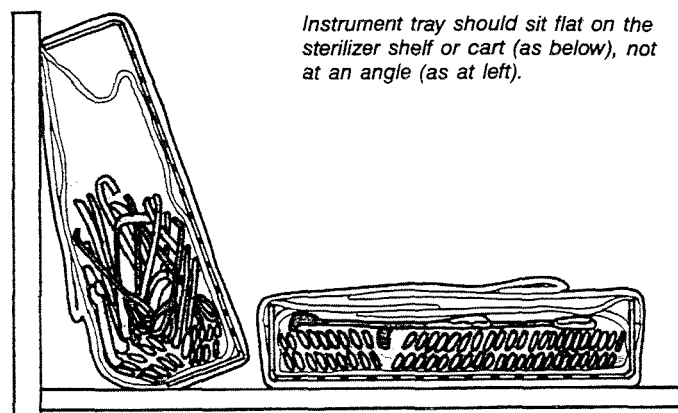
- Not all trays, although called “instrument” trays, are necessarily suitable for, or designed with, heavy instrument sets (16-17 pounds) in mind.
- Check a catalog from a multi-product vendor of hospital supplies to read the description of the instrument trays available. None of the stainless steel “**cake pan**” trays or **flat trays without holes** is advertised with instrument set assembly and sterilization specified.

Those same trays manufactured **with holes** specify their use for sterilization and that the trays can be sterilized “upright or flat.” They are not marketed as “instrument trays,” — they are called “perforated trays.” No specific application for use is indicated. They were originally intended for the sterilization of porous items or sets that contained only a few light instruments with drapes and dressings.

These trays are commonly used for the assembly of **small instrument sets** such as the cut-down, suture and lumbar puncture trays that are used throughout the hospital. These sets are usually not densely laden with metal instrumentation and there are other materials (dressings, towels, and drapes) to balance the heat sink and evaporative events that take place during sterilization. **Less condensation** occurs within these small sets because there is **less cold metal mass** to absorb heat. Condensate is created when heat is being absorbed by cold metal items. Smaller masses of metal usually create a smaller amount of condensate that is generally easy to reevaporize and/or dry during the cycle.

Trays with **too few** or **no** holes, if placed flat during the sterilization process, could pool condensate because free drainage and evaporation can be prohibited. It is appropriate to stand these **small, light weight** trays of instruments on edge for sterilization (the towels, sponges and wrapper, generally help to keep the few instruments in place). However, trays without holes should **never** be used to assemble **heavy** instrument sets for sterilization.

- When any tray heavily laden with surgical instruments (each instrument of a different weight or density) is tilted on edge, the instruments are presented to the sterilization



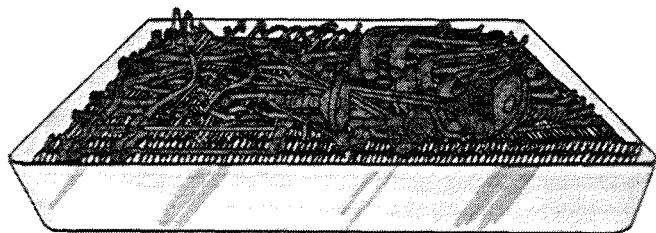
Instrument tray should sit flat on the sterilizer shelf or cart (as below), not at an angle (as at left).

process as a "pile" of metal. All of the instruments heat up and cool down at different rates of time, and in that position there is very little chance to avoid the formation of excess condensation or wetness. This excess moisture cannot drain off or easily evaporate when the instruments are sitting on a solid metal surface. The metal acts as a heat sink and, as it absorbs heat from the steam, the vapor actually collapses or condenses and becomes water. In some cases, that water is in excess and can be very difficult, if not impossible, to revaporize and/or dry.

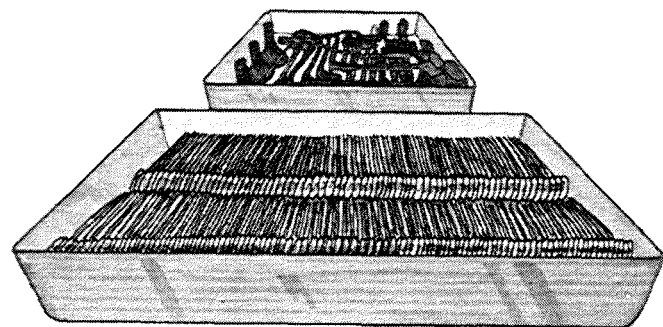
Heavy instrument sets should **never** be presented tilted on edge to the sterilizer.

Instrument sets that weigh no more than 16-17 pounds have a far better probability of drying. However, it is necessary to:

- Choose the proper size tray so that the mass of metal instrumentation can be evenly distributed. Avoid placing 16 pounds of instruments in a tray only large enough to hold 8 pounds.



Do not overload instrument trays. Instead...



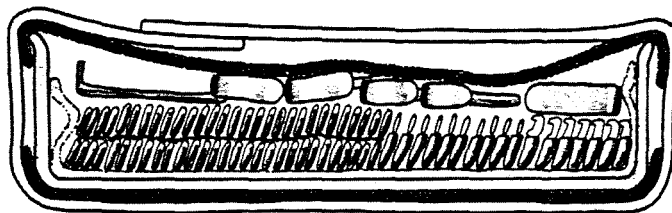
...use an additional tray to divide the mass of instruments.

- If for some reason a tray of instruments must exceed the recommended 16-17 pound limit, choose a tray large enough to spread out the mass of instrumentation. This allows the heat exchange and evaporative events to take place more efficiently and will, hopefully, lessen the chance of a wet pack.
- Consult the manufacturers of the rigid sterilization container systems for their sterilization weight recommendations and documented results.

Absorbent surgical towels within wrapped instrument set assemblies seem to aid drying particularly when water repel-

lent non-woven wrappers are used. Excess moisture more readily dries from absorbent material than from droplets or pools on solid metal surfaces. Disposable or reusable absorbent towels are appropriate and can be used:

- Between the bottom of the instrument tray and the wrap material.
- Between the instruments and the inner surface of the tray.
- On top of the instruments prior to wrapping.



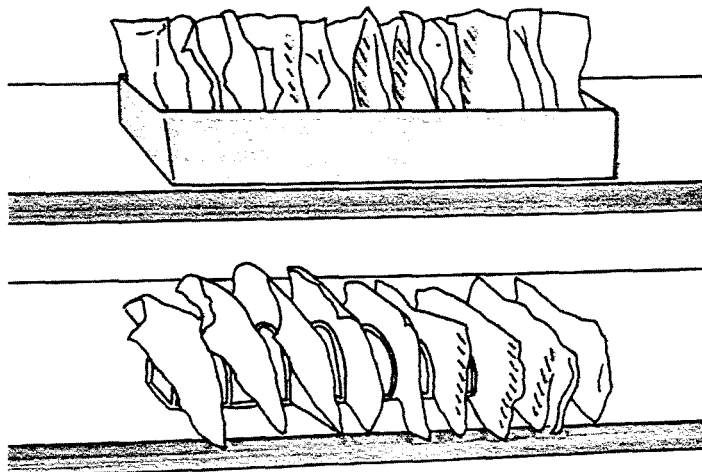
Properly used absorbent surgical towels will aid drying.

In some instances, a towel may be used to separate layers of instruments in a tray (the heavy instruments on the bottom and lighter instruments on top). Reticulocell foam products (tray liners and instrument pouches) are also available and can be used to accomplish the same result.

But the addition of absorbent material should not be considered a substitute for lightening dense or overweight instrument sets. Some rigid sterilization container manufacturers suggest the use of **absorbent** towels within the sets.

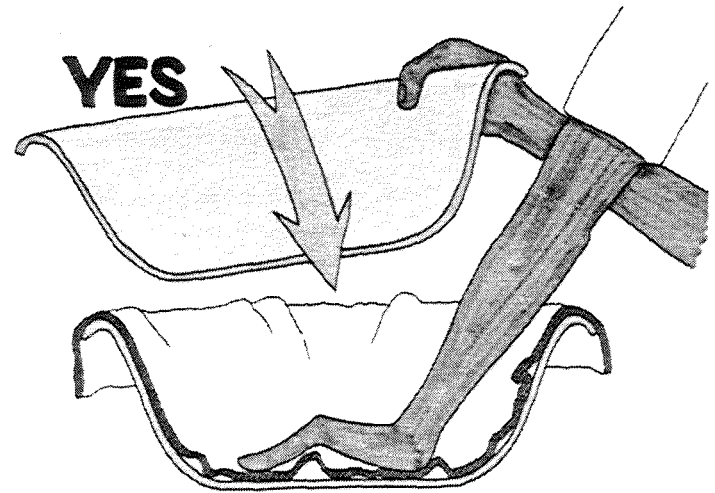
Carefully examine sophisticated or special surgical instruments/devices and request instructions from the manufacturers regarding disassembly for cleaning and sterilization. Some devices can be disassembled and should be so that steam/condensate is not trapped; subsequent escape of that moisture can cause a wet pack.

Paper/plastic peel packages of instruments should be presented to the sterilizer standing on edge for proper air removal, sterilant penetration, EVACUATION & DRYING.



Stand paper/plastic peel packages on edge for sterilization.

- Double packaging requires a “paper to paper,” “plastic to plastic” configuration so the package can properly “breathe” in sterilization and **dry**.
- Packages placed **plastic side down** in sterilization may exhibit moisture within the package that is found on the plastic; likewise, packages placed **plastic side up** may exhibit water on the outside of the package, on top of the plastic.
- The inner package should not be so large that it must be folded several times before it can be placed into another package. That, too, can prohibit proper air removal, sterilant penetration, EVACUATION & DRYING.

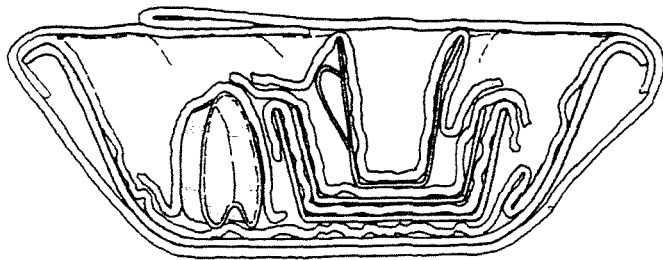


“Pie crust” approach produces...

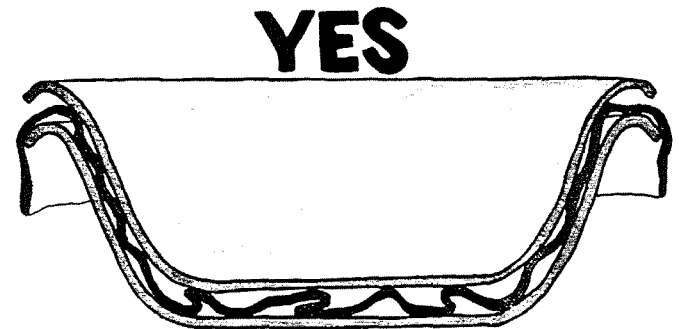
BASIN SET PREPARATION

The need for a thoughtfully developed and specific protocol for Basin Set assembly is essential. Strict attention to detail is very important because all items within the set must be positioned so they will not hold water when tilted for sterilization.

- The assembly and wrapping method should be consistent from one person to the next. Anyone looking at a wrapped pack should be able to describe the exact position of each item within; specifically, each item's relationship to the outside “landmarks” of the pack. When this is practiced, there should be no question regarding proper position of the pack for sterilization.
- The weight of a basin set should generally not exceed 7 pounds (consider the earlier discussion regarding the heat up and condensate characteristics of metal).

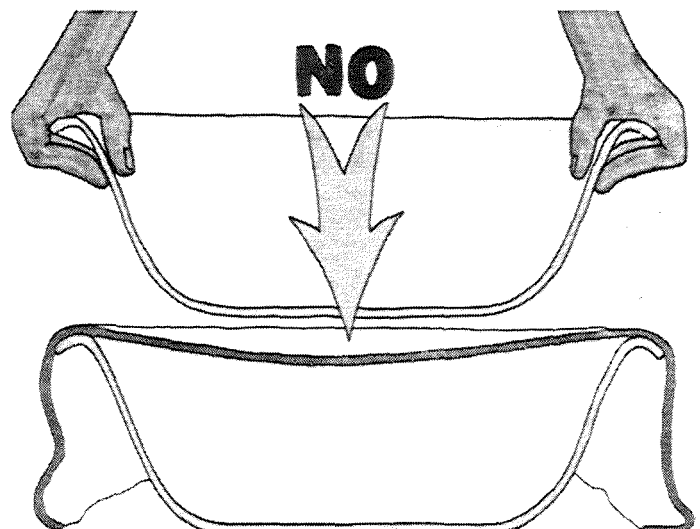


Wick all nested utensils.



... the correct result.

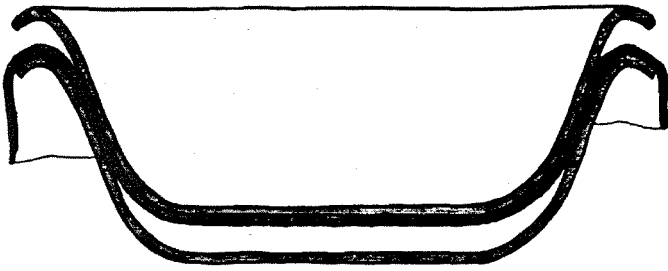
towel will be able to absorb any condensate that may form between the basins and aid in drying. The towel can prevent “roll off” of that condensate from the metal surface onto the wrapper.



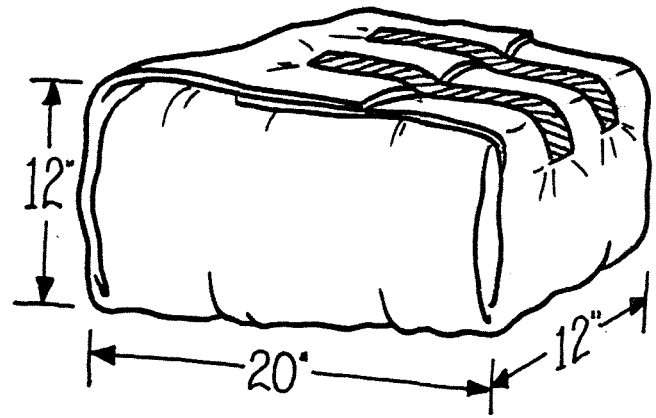
Failure to use “pie crust” approach produces...

- All nested utensils must be separated (wicked) by an absorbent surgical towel (reusable or disposable). “Wicking” all of the surfaces assists proper air removal, sterilant contact, EVACUATION & DRYING.
- When two large solution basins are separated, be certain that the absorbent towel is fully opened and seated within the bottom basin as you would a “pie crust.” In that way the

NO



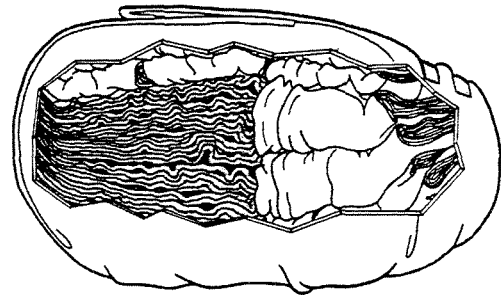
... this bad result. Towel clings to upper basin rather than sitting on surface of lower basin to absorb moisture.



Pack density should be no greater than 7.2 pounds per cubic foot.

- Be careful with certain utensils that have "curled" or turned rims (some trays, emesis basins and large solution basins) that can "cradle" condensate. Stand an emesis basin of this type on edge in a basin set and be particularly aware of its position within the pack when it is placed on a cart/shelf for sterilization. Some large solution basins and trays with particularly curled rims are aided in drying by being certain that, when tilted for sterilization, they are sitting directly on some of the absorbent toweling within the wrapper, and the angle of tilt is not too acute.
- Hollow surgical light handles need to be (inverted) positioned for drainage when included in Basin Sets.
- Small items that cannot be secured in basin sets, so they do not reposition and catch condensate, should be eliminated from the set (e.g. medicine glasses).
- Remember, improper positioning of items within a pack or in the sterilizer can result in a wet pack.

- The contents of a linen pack can usually be rearranged and/or loosened to decrease the density.

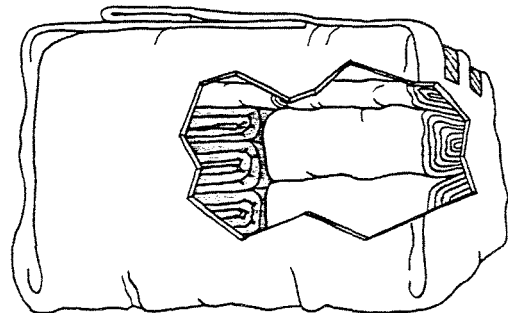


Too tightly wrapped pack can prohibit air removal, sterilant penetration, and drying.

LINEN PACK PREPARATION

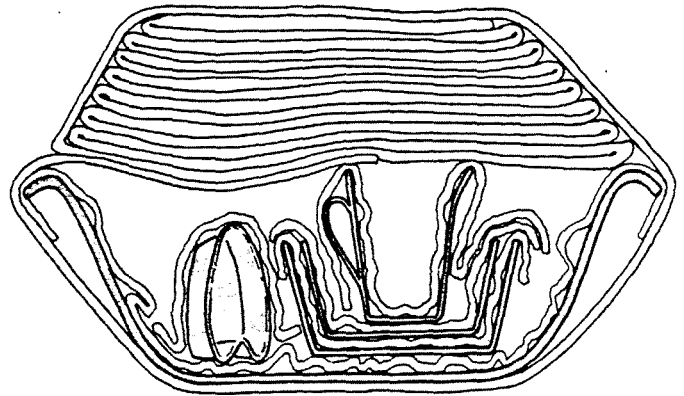
Attention to detail and a specific protocol remains important for linen pack preparation. All linen packs, instrument and basin sets should be prepared with freshly laundered linen.

- A linen pack should weigh no more than 12 pounds. At that weight the contents should be arranged so that the pack equals 12" wide by 12" high by 20" long to achieve a Pack Density no greater than 7.2 pounds per cubic foot.
- It is important to understand that a pack that is too dense can prohibit proper air removal, sterilant penetration, EVACUATION & DRYING. Even a package of ten surgical towels can be wrapped so tightly that its density could exceed 7.2 pounds per cubic foot.



Density of this pack is within appropriate limits.

- Excessive layers of tightly woven water-repellent fabrics within a linen pack may need separation by absorbent, less dense fabrics.
- Position the linen packs on the sterilizer shelf/cart so that the internal layers of fabric are vertical (to the shelf). In other words, not sitting flat on the shelf as the stack of horizontal layers of linen.
- Avoid overloading the sterilizer by "**forcing**" the last pack in the load. That in itself could prohibit efficient drying of properly prepared linen packs.



Too many layers of fabric on top of basin set.

STERILIZATION in brief:

Sterilizer Cart

The use of **absorbent** covers on sterilizer shelves/carts (under the items to be sterilized) is helpful in drying a load particularly when water-repellent wrap materials are used. Consider recycling old lint-free, absorbent wrappers or thermal blankets; cut them to shelf size and bind the edges. Change covers at least daily and launder regularly since the covers may become soiled as a result of poor steam quality. Do not use non-woven water-repellent wrappers as shelf covers. Condensate more readily dries from absorbent materials.

It is preferable to sterilize linen and hardgoods in separate loads considering the dynamic difference of how the loads heat up and cool down.

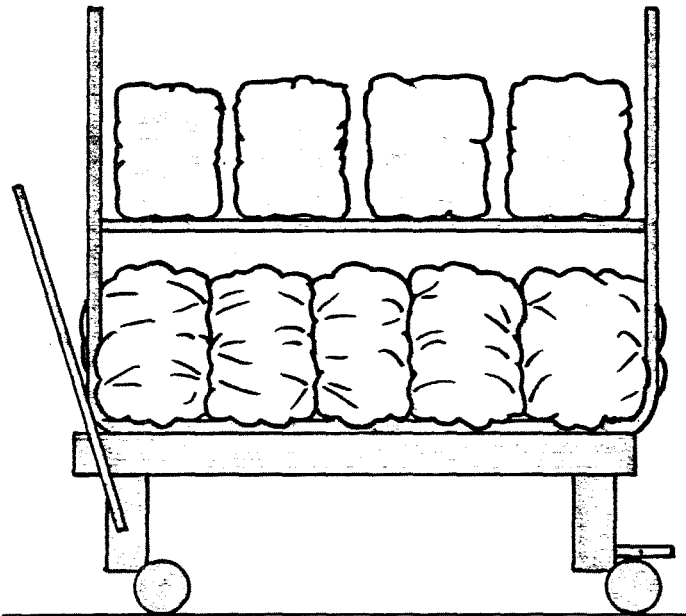
- Linen loads are generally easy to dry when good quality steam is provided during sterilization.
- When linen packs and hardgoods need to be sterilized in the same load, the hardgoods must occupy the lower shelves. Place linen on the top shelves to avoid condensate run-off from the metal onto the fabric packs.

IMPORTANT Considerations:

- Packs that are wet when placed into the sterilizer can be expected to be wet when removed from the sterilizer. Instruments that have been immersed in instrument milk need to be dry before they are wrapped and sterilized.
- Do not park hot loads in line with air conditioning vents in an attempt to expedite cooling.
- Allow a load to cool for at least 30-60 minutes untouched, prior to storing and/or examining for wet packs. Remember, instrument and utensil sets cool slowly.

Carefully examine the pack, and notice exactly where items sit on the cart/shelf in relation to any dampness found so that you can more easily consider the possibilities and/or source.

Carefully observe where wetness occurs within a pack or set and whether there are any significant or like circumstances that might be pinpointed.



Top shelf is O.K. Bottom shelf is too tightly loaded.

WRAPPING in brief:

Remember that the basic purpose of the sterilization wrapper is to securely contain the items (instruments, utensils, linen, etc.) within, permit the process of sterilization to take place, and safely confine the sterilized product until it is used.

With that in mind and realizing that proper air removal, sterilant penetration, EVACUATION & DRYING are so dependent on proper preparation techniques:

- Choose a product that is recommended for use as a sterilization wrapper.
- Avoid using wrappers that are larger than you need to safely contain the product because you desire the wrapper to serve a dual purpose.
- Consider that a pack wrapped with excessive folds and layers of wrap material on top may prohibit the efficient process of sterilization and/or drying.

In other words, a wrapper is a wrapper, a ringstand cover is a ringstand cover and a table cover is a table cover.



This will expedite cooling, but may cause condensation.

Surgical towels or linen within a pack and/or sets should be fully opened and shaken out prior to scrutinizing for wetness. You will notice a difference. A hot/warm towel may feel moist at first, but one or two good shakes can eliminate the vapor and the fabric may feel "dry as a bone!"

- Do you have a sufficient number of surgical instrument sets available to reasonably support daily surgical procedures? Avoid bypassing necessary processing stages to expedite the workload.
- Do you have sufficient sterilization capacity available to accomplish the daily workload?

Are you overloading sterilizers to keep up?

Are sterilized items allowed to cool on the sterilizer cart/shelf before handling?

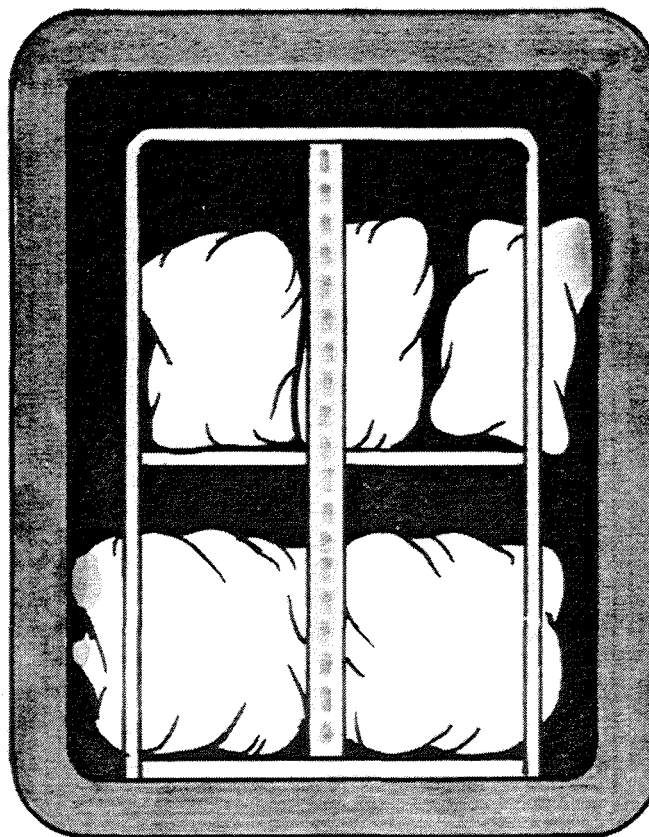
Are warm items placed on cold surfaces or stacked in storage before they are sufficiently cool?

Are sterilizer items cool before they are heat sealed in plastic dust covers?

Do you have an adequate number of sterilizer loading carts or cars so that sterilized items are not touched before properly cooled? Examine the process and determine your cart needs. Consider this approach: one cart in the sterilizer, one cooling, and one being prepared with items to be sterilized.

- Items that fall against a chamber wall may absorb excess moisture. Consider containing them in perforated baskets to prevent this occurrence.
- Check and clean the sterilizer chamber drain screen **at least daily**. A clogged or obstructed drain can prohibit proper drying. Furthermore, the entire chamber surface must be kept clean for the most effective drying by radiant heat.

- There are instances where insidious moisture persists even after all of the possibilities for cause have been investigated and corrected. In this case, the wrapper is dry but moisture can be found in the form of slight dampness on absorbent



Items that fall against a chamber wall can absorb excess moisture.

towels WELL WITHIN an instrument or basin set. It is not inappropriate in this instance to attempt to assist drying. Consider experimenting with the addition of "BAKE TIME."

Following a completed sterilization cycle unseal and **slightly** open the sterilizer door (some sterilizers automatically unseal after the cycle). Residual steam vapor will escape and the load will "bake" by chamber heat. Avoid fully opening the door to avoid the introduction of cooler air into the chamber during the "Bake Time."

• Experiment — Try a:

20 minute "BAKE TIME" — with door slightly open.

30-60 "COOL TIME" — sterilized items remain on the cart, out of the chamber — UNTOUCHED.

Examine the items to see if the "BAKE TIME" was of assistance. Additional time may be needed.

TO SUMMARIZE:

It is important to understand that the "drying times" recommended by the various sterilizer manufacturers can only be expressed as MINIMUMS. It would be virtually impossible to do otherwise considering all of the variables that have been previously cited.

Think of all of those variables and then multiply them by all the hospitals in the world and then by all the personnel in those hospitals who take part in the process. Considering the odds, I'm surprised that wet packs aren't a more frequent problem than they are.

In any case, the PLAYERS need to concentrate on their role and its impact on the process of sterilization. Then, do what they can collectively to prevent and/or solve wet pack problems.

As a **TEAM** we can make a significant reduction in the incidence of wet pack problems and how long it takes to solve them. **Cooperation is the key!**

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